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AN EXPERIMENT IN THE CLASSIFICATION OF FIRST- GRADE CHILDREN THROUGH THE USE OF MENTAL TESTS

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Every school system of respectable size has made repeated surveys of the age-grade status of the children in the system during recent years. The percentage of non-promotions and the consequential clogging of the system by retardates have been matters of some concern. Opportunity classes have been organized to minister to the needs of the exceptionally bright as well as special classes to take care of the exceptionally dull.

But in regard to classifying adequately the millions of fairly typical school children, after these compelling problems have been handled, the schools are largely at sea. Chronological age is still permitted to be the most important factor in determining school placement, although in reality it has scarcely more to do with the character of the school work of a child than has the size of the shoe which he is wearing.

In almost every city there are schools to which the children come from homes that are foreign, where little or no English is spoken, where the parents are generally illiterate and endow the child with little mental inheritance. In such cases the child's experiences have been limited to those that he encounters in the street or in the squalor of his own backyard. There are other schools attended by children coming from homes of affluence and plenty—children who possess the finest type of mental inheritance and a stock of experiences which are in direct antitheses to those of the less fortunate children to whom reference has just been made.

In the democracy of our public schools these children figuratively, and often literally, are put side by side. At the end of the

first year they are promoted to the second grade, theoretically equally well prepared to go on with their work. But when their capacities for doing school work are measured in a scientific manner, it is found that there is wide variation, not only among those from different strata of society, but also among those from the same stratum who have had similar opportunities.

The writers, one of whom has had the privilege of working for several years in a comparatively large city school of distinctly foreign type, first became interested in an analysis of the intelligence of school children as a result of the consciousness that the percentage of non-promotions in this school was inordinately high as compared with other schools in the Rochester system. Second, attention was focused on individual differences as the result of a study of the problem of teaching reading to these children made in connection with the rather extensive use of the Gray oral and silent reading tests. The poor results achieved in the use of these tests over a period of three years were convincing evidence that there were factors other than methods of instruction involved.

In the Susan B. Anthony School, Rochester, New York, one is face to face with the foreign problem in seemingly its most intensive form. There were 1,961 pupils enrolled in this school last year. Of this number, about 98 per cent were Italians, mainly of Sicilian and Calabrian stock. Probably 50 per cent or more of the children under eight or nine years of age had never been out of the immediate vicinity of their homes and were very limited therefore in their stock of concepts. Such concepts as they possessed had, of course, been acquired largely on the street. The average intelligence quotient of children of this type is comparatively low, as the tables presented later will show.

For several years it has been the practice in the Susan B. Anthony School to group the children according to the teacher's judgment of ability. For instance, the several 4B grades are designated 4B-1, 4B-2, 4B-3, etc., the 4B-1 being the largest and made up of the brightest children. The poorest of the several grades, e.g., 4B-5, is considerably smaller and is made up of the least capable children. This plan has secured a relative amount of homogeneity in each group and permits an adjustment of the work to the capaci-

ties of the children. The best group is given a somewhat enriched curriculum, while the poorer groups, especially the poorest, are held accountable for only the minimum essentials.

In spite of the fact that the plan of organization in vogue has simplified the problem to some extent and, further, that the mentally deficient are each semester sorted out and segregated in special classes (seventy-eight children being in such classes last year), there has been a strong feeling on the part of both principal and teachers that many children are not properly placed in the grades and that the way to get to the root of the problem is through a careful analysis of the intelligence of the children when they enter the first grade.

The first test of the kindergarten children was made in May and June, 1920. At this time 130 children were tested for the purpose of classifying them for the first grades to be organized in September, 1920. When school opened in September, 113 new children who had not been in the kindergarten in June appeared for the first grade. These were also tested, making a total for the semester of 243 children. During the second semester the work was continued through the testing of 171 additional children. A total, therefore, of 414 first-grade children were tested and classified during the year. The work was done under the supervision of A. Leila Martin, director of the Child Study Department of the Rochester public schools. The Stanford Revision of the Binet Test was used with all of the children during the first year.

Table I is a summary of the mental ages of the children who were ready chronologically (i.e., five years and ten months of age or older) for 1B work in September, 1920, including June and September examinations. There are also included eight children chronologically too young but mentally ready. Those tested during the second semester are not included.

It will be seen from Table I that there is a wide range of mental ages in the usual 1B grade of a foreign school. The total range is from three years to seven years and eleven months. Of the 210 children ready chronologically for the 1B grade, only seventy-three children or 35 per cent were mentally six years of age and therefore ready for first-grade work according to the generally accepted

mental standard; eighty-five children, or 40 per cent, were mentally between five and six years of age; forty-one children or 20 per cent were between four and five years of age mentally, and eleven children or 5 per cent were less than four years of age mentally.

TABLE I
MENTAL AGES OF FIRST-GRADE CHILDREN

Mental Age in Years and Months	Number of Children Chronologically 5-10 or Older	Number of Children Chronologically Less than 5-10
3-0-3-5.....	2
3-6-3-11.....	9
4-0-4-5.....	20
4-6-4-11.....	21
5-0-5-5.....	43
5-6-5-11.....	42
6-0-6-5.....	42	6
6-6-6-11.....	15	1
7-0-7-5.....	14	1
7-6-7-11.....	2
Total.....	210	8

For the entire school year, September, 1920, to June, 1921, 356 children chronologically ready were tested to determine their fitness to do first-grade work. If a mental age of six years is required for entrance to the 1B grade, 245 or 69 per cent were not ready; 31 per cent were ready. If a mental age of five years and ten months is required, 226 or 63 per cent were not ready. If a mental age of five years and six months is required, 180 or 51 per cent were not ready.

It is fair to ask just what mental age is necessary to enable a child to do satisfactory 1B work. Dickson found from a close study of 1,000 first-grade children that "below the mental age of six years the child is not ready for first grade and that below the mental age of five and one-half years the chances that really standard first-grade work will be done are practically negligible."¹ Dickson also found that 27 per cent of the 1,000 children tested were less than five and one-half years of age mentally. In the Susan B. Anthony School 51 per cent of those included in the first year's study were less than five and one-half years in mental age.

¹ Louis M. Terman, *The Intelligence of School Children*, p. 47. Boston: Houghton Mifflin Co., 1919.

According to Terman,¹ in the average city about 25 per cent of the first-grade children fail of promotion. For the three years previous to September, 1920, an average of about 20 per cent failed in the Susan B. Anthony School in the first grade. The results of the mental testing suggest that in all probability at least 50 per cent of those chronologically ready should not have been admitted to the first grade.

In this connection, the Binet test was given to fifty-five children, ten in the 1B grade and forty-five in the 1A grade, who were suggested by the teachers for demotion or repetition of the grade. The mental age in each case was then estimated back to the date when the child entered the 1B grade, with the results given in Table II. It will be observed that forty-nine of the fifty-five "failures" were children whose mental ages were less than six years when they entered the 1B grade. Thirty-seven had mental ages less than five and one-half years.

TABLE II
MENTAL AGE OF FIFTY-FIVE REPEATERS IN
THE FIRST GRADE

Mental Age in Years	Number of Children
4.0-4.4.....	3
4.5-4.9.....	8
5.0-5.4.....	26
5.5-5.9.....	12
6.0-6.4.....	3
6.5-6.9.....	3
Total.....	55

An analysis of the marks given by the teachers to the fifty-five repeaters showed an aggregate of 336 marks. Of this total, 228 or 68 per cent were "passing" marks. This would seem to indicate that these children, unable to do the work of the next grade, had to a large extent been overrated. This is a common tendency on the part of teachers in dealing with the chronologically old but mentally slow.

The range of I.Q.'s is shown in Table III for the first group tested in June, 1920. The median I.Q. for the group of 130 children

¹ *Ibid.*, chap. iv.

is less than 90; the mental age is above the chronological age in twenty-seven cases or 21 per cent. The distribution of the I.Q.'s in each of the other groups tested revealed a similar condition, viz., the median I.Q. is more than 10 per cent lower than we should expect it to be in the case of a normal group.

TABLE III
DISTRIBUTION OF I.Q.'s OF 130
KINDERGARTEN CHILDREN

I.Q.	Number of Children
?- 50.....	4
51- 60.....	4
61- 70.....	15
71- 80.....	20
81- 90.....	26
91-100.....	34
101-110.....	16
111-120.....	8
121-130.....	3
Total.....	130

Table IV is a sample of the record that was kept for each child. The cases here exhibited were chosen at random from the June group of 130 kindergarten children proposed for 1B work and arranged in the order of descending mental ages.

TABLE IV
TEST RECORDS IN ORDER OF DESCENDING MENTAL AGES

PUPIL	DISPOSAL GROUP	TEACHER'S ESTIMATE	CHRONOLOGICAL AGE	MENTAL AGE		I.Q.	HEALY PICTURE FORM BOARD PERCENTILE		GODDARD SEQUIN PERCENTILE TIME
				June, 1920	September, 1920 (Estimated)		Time	Errors	
C. S.	1	A-1	5-10	8- 6	8- 9	111	100	100	80-90
S. M.	1	A-2	5-10	6- 6	6- 9	111	50-60	20	30-40
J. N.	2	A-1	6- 0	5-10	6- 1	97	10-20	0	80
V. F.	3	S-3	6- 0	5- 2	5- 5	86	40-50	10-20	100
C. T.	4	A-3	6- 0	4- 2	4- 4	69	1-10	20	0
C. C.	K	S-1	6- 2	3- 8	3-10	59	20-30	30	0-10

The disposal column in Table IV shows the group in which the child was placed after the test. The teacher's estimate before the

test on the basis of the six groups from Apt 1 to Slow 3 is indicated in the third column. Since the test was given in June, the mental age in September had to be calculated from the I.Q.

The 130 kindergarten children were classified into grades on the basis of mental age for the semester beginning in September, 1920, as shown in Table V. This table shows that the median I.Q. of the 1B-3 grade was somewhat higher than the median I.Q. of the 1B-2 grade. This is due to the fact that the children in the 1B-3 grade

TABLE V
RANGE OF 1B GRADES, SEPTEMBER, 1920, TO JANUARY, 1921

Grade	Range of Mental Ages*	Range of I.Q.'s	Median I.Q.	Number of Children
1B-1	6-1-7-6	87-122	104	35
1B-2	5-10-6-10	75-104	89	33
1B-3	5-7-8-10	79-101	97	27
1B-4	4-6-5-8	74-91	86	32
1B-5	4-8-5-6	67-87	78	32
1B-6	3-8-4-6	58-73	69	12
	3-4-7-4	43-98	88	14
1B-7 or Pre-primary	3-8-4-6	59-77	70	25

* No mental ages for ten children in 1B-6 on account of language difficulties.

were chronologically somewhat younger than those in the 1B-2 grade. Actually the median mental age in the 1B-2 grade was higher than the median mental age in the 1B-3 grade. It has been with mental ages rather than I.Q.'s that we have been concerned. The 1B-6 grade was made up partly of a group of children concerning whose mental ability there was some uncertainty because of language or other difficulties and partly of a group of late entrants of somewhat higher mental status who, because of the late start, could not be assimilated in the better groups. The 1B-7 grade was made up of the lowest group of those concerning whose mental ability there was a reasonable amount of certainty. This was the first so-called "pre-primary" grade, and, of course, 1B work as such was not attempted with this group. From the 1B-1 grade at the end of the semester, twenty-eight children were promoted to the 1A-1 grade, a select group which was to do two terms' work in one. These children were all to be above seven years of age mentally in June, 1921, and their I.Q.'s ranged from 100 to 122. From the 1B-7 grade or the

pre-primary group eight children were promoted to a regular 1B grade at the end of the semester. The remaining seventeen were retained in the pre-primary grade for the second term.

It should be noted here that while a classification of the children on the basis of mental age was made in this first instance to insure a relatively high degree of homogeneity, nevertheless the maximum benefit of such classification was not realized, since altogether too many children of low mental age were permitted to attempt regular 1B work. This condition was corrected in the work of the past year.

A similar classification of the 1B grades was made for the spring and fall terms of 1921. The results were eminently satisfactory. The time required to give the Binet test to a large number of children, however, has been a factor for serious consideration. During the year, 1921-22, the Detroit First Grade Intelligence Test was used as a means of preliminary classification in order that time might be conserved.

It should not be understood that the group test adequately takes the place of the individual Binet test in the matter of classification. It does, however, provide for a quick but rough classification of all of the children just before promotion, at a time when it is practically impossible to give all an individual test. In classifying the children for the spring term of 1922, it seemed expedient and desirable to check results with individual tests as far as possible. The Binet test, therefore, was given before promotion to all children whose group test score and teacher's estimate were widely at variance, to all those not tested with the group test and concerning whose disposition there was some uncertainty, and to all whose final rank or test score was at or near the median. After promotion all children who had been placed in a regular first grade were given the individual test. Of 124 children in the kindergarten who were considered in January, 1922, forty were tested before promotion with individual tests and forty-six after promotion, while thirty-eight were not given individual tests at all because it was apparent that in general ability their rank was so low that the individual test was not necessary.

After the grades had been organized, the teachers were asked how the children were adjusting themselves to the first-grade work. Seven changes seemed necessary; that is, seven children who had

been put in the first grades on the basis of the group test were later changed to some other group because of the individual test score and the teacher's judgment. In general, therefore, it may be said that the group test was of considerable help in the matter of classifying the children quickly. Seventy-eight children who were in pre-primary grades during the preceding semester were also tested in January, 1922, the same procedure being followed as that employed with the 124 kindergarten children.

In the final disposition of the children tested it is worth noting that thirty-one children in the kindergarten who were chronologically ready for 1B work tested so low that they were held in the kindergarten for another semester, while thirty-eight children were assigned to the pre-primary grades. Of the seventy-eight children who were in pre-primary grades, thirty-five were retained in the pre-primary; twenty-eight were assigned to the 1B-x grade, a slowly moving grade which takes three terms to do two terms' work; while fifteen went to regular 1B grades.

CONCLUSIONS

1. A degree of homogeneity in the ability to do first-grade work has been obtained that heretofore was lacking in the same situation. Occasionally there is a misfit and some replacements are necessary after a grouping has been made, but in general the teachers are agreed that much more may be accomplished because all of the children are nearly on a par mentally.

2. It has been observed that nearly all of the children who have failed in first-grade work were among those of low mental age and low I.Q. Those of at least six years mental age and of normal I.Q. have uniformly been equal to the work of the first grade. The results would tend to show, therefore, that the Binet test is a reasonably reliable method of classifying young children.

3. Since fully one-half of the children who are chronologically six years of age are less than five and one-half years of age mentally, it has seemed desirable to group these children in pre-primary classes. To some extent the limitation of these children may be one of language difficulty. In general, however, it is a lack of mental alertness. These children are slow to comprehend and slow to react. On all work attempted they need an abundance of drill.

4. In every group tested there has been a small percentage of children of distinctly superior mental endowment. The segregation of these children in a select group makes it possible to give them more than the normal amount of work and to develop in them the habit of working up to their capacity.

5. Growing out of the intensive study of the mental ages of the kindergarten and first-grade children has come the thought that much discouragement due to non-promotion may be obviated through the use of the I.Q. as a basis of prediction of the child's progress in school. More than one-half of the children tested in the Susan B. Anthony School have an I.Q. less than 90. Slowly moving grades, in which three semesters are devoted to the work ordinarily completed in two, have been organized to take care of these children. It does not seem practical to provide slowly moving groups in every grade. The present plan is to provide them in alternate grades, e.g., the first, third, and fifth. It is assumed that the child who has an I.Q. of 80 will advance only approximately 80 per cent as rapidly as a normal child and that it will take him from 20 to 25 per cent longer to complete the six elementary grades. We are not especially concerned with those children who have an I.Q. less than 75. Such children doubtless will become special-class subjects. The majority of our retarded children have an I.Q. ranging from 75 to 90. It is thought that, by providing a slowly moving group in the first, third, and fifth grades and by placing mentally slow children in these groups partly on the basis of the Binet test and partly on the basis of the teacher's judgment, the opportunity will be provided for bringing the mental age of each child up to the standard required for each new grade by the time he is permitted to reach it. Thus, by providing for four places for holding back children with low I.Q.'s—that is, a term each in the pre-primary, first, third, and fifth grades—it is expected that the mental age in the great majority of cases will reach the level required for the work of the second, fourth, and sixth grades taken normally. We are thus planning deliberately for possibly two years' additional time for children who have an I.Q. of 75 to 85, although no child will be obliged to take this additional time if it is at any time apparent that he is able to do the work at a normal rate.

We are not positive that our four-point location for holding back the children with low I.Q.'s is the best, and only continuous experimentation and checking will give us the answer. We are also in doubt whether our findings now and later will signify much for elementary schools not confronted with our type of foreign problem. We are convinced, however, that the principle of slowly moving groups is sound from both a psychological and a sociological viewpoint and that it will go a long way in our type of school toward individualizing instruction and preventing retardation as generally viewed and the resultant habits of failure and discouragement. We believe, furthermore, that herein we are securing excellent educational returns with a minimum disturbance of the school organization, size of teaching personnel, standardized curriculum, and the school democracy which we seek to develop.